TITLE	**WORK METHOD STATEMENT**
PROJECT	**SCP-JCP T/A-2024**
ITEM	**R-3201 ALKYALATOR REACTOR**
CUSTOMER	**SAUDI CHEVRON CO.**
CUSTOMER'S REF.	**25001156**
REVISION	**0**
ISSUED BY	**MD IRFAN**
DATE	**14/11/2023**

SULZER CONFIDENTIAL

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1.0 INTRODUCTION

The following instructions aim to highlight the methodology behind the R-3201-Removal /new-installation, cleaning &inspection of reactor internals

2.0 SCOPE OF WORK

To carry out the inspection, Cleaning & Removal - Re-installation of column internals as per drawings referenced below in section 3.0. All the work is to be carried out with the emphasis on safety, over and above all other considerations, and is subject to the statutory and mandatory health and safety regulations appertaining thereto, together with the Sulzer Chemtech (UK) Limited SCC and S-chem project procedure, manual and HSE plan.

3.0 DETAIL SCOPE OF WORK

Pre-Shutdown activities-

- Mobilize tools & tackles to site
- Erect scaffolding outside for blinding access if any – By Client
- Blind location identification and tagging
- Material Issuing from store
- Material identification and segregation
- Mock-up of materials

Shutdown activities-

- Blinding of reactor for steaming.
- Decontamination- by S-chem.
- Bling of reactor for reactor internal work.
- Open Manholes-13 no's
- Install Air Mover & lighting.
- All instrument, PT, LT, and Level Glass apparatus taps to be disconnected.
- Gas Free Reactor.
- Issue vessel entry permit

Internal Work

- Joint inspection by Sulzer & S-Chem team
- Erection of scaffolding at bottom dish end - By S-Chem

TOP SECTION

- Removal of inlet pipe above top bed for access purpose.
- Removal of pre distributor & VER2 distributor for access purpose.
- Removal of RPB bed limiter for access purpose.
- Clean & inspect top section internals.
- Hydro jet cleaning of removed internal outside of reactor.

- Inspect & level check of random packing.
- Top up random packing if required as per inspection recommendation.
- Inspection by S-chem.
- Install bed limiter.
- Install; VER2 & pre distributor.
- Inspection by S-Chem

CATALYST BED REPLACEMENT (BED #1 TO #8)

- Remove distributor pipes from catalyst Bed #1, 2, 3 & 4.
- Remove hold down grid from each catalyst Bed #1 to #8.
- Remove Arocat Bales (large/small/mini), Arocat EB-B1, Beta Zeolite from each catalyst Bed.
- Clean & inspect catalyst support grid at each Bed.
- Hydro jet cleaning of removed distributor pipes.
- Buffing support as required for inspection.
- Load Arocat Bales (large/small/mini), Arocat EB-B1, Beta Zeolite at each bed as per loading diagram- in presence of Operation or Vendor.
- Reinstall hold down grid at each Beds.
- Reinstall Distributor at Beds #1, 2, 3, & 4.
- Final joint Inspection on Beds.

BOTTOM SECTION

- Remove reflux distributor & hydro jet cleaning.
- Remove feed distributor & hydro jet cleaning.
- Manual clean & inspect UOP MD trays #1, 8, 9 & 10.
- Erect scaffolding at bottom dish end-by S-chem.
- Hydro jet cleaning of bottom sump.
- Buffing support for inspection.
- NDT inspection by S-chem
- Reinstall reflux and feed distributor.

Skirt Area

- Open Skirt manways
- Set up ventilation &24V lights
- Scaffolding, Insulation & NDT work - By S-Chem
- Close Skirt Manways
- Final inspection by S-Chem
- Connect back all instruments, PT, LT, and level glass apparatus taps
- Removal internal scaffolding - By S-Chem
- Remove Lights & ventilation
- Execute vessel closure inspection and complete form
- Column Manhole Box up
- De blinding of column

4.0 DRAWING INDEX: - NUMBER AND DESCRIPTION

2161243-001-009-1/1	Pre distributor
2161243-001-007-1/2	VER2 Distributor
2161243-001-003-1/1	GIS Vapor injection Plate
2161243-001-001-1/1	RPB Bed Limiter
1-106.226.365-1/1	Internal Arrangement
DA-7478-02-008	Catalyst support grid
DA-7478-02-009	Catalyst support grid support details
DA-7478-02-10	Feed Distributor for nozzle-12A,12B,12D
DA-7478-02-10	Vapor return Distributor for nozzle-22

5.0 MAIN EQUIPMENT

NO.	DESCRIPTION	COMMENTS
1	Hand tools	Sulzer
2	Inertia reels/safety harnesses/certified lifting equipment.	Sulzer
3	Forklift / Trailor	Sulzer
4	Manhole watchers/Stand by men.	Sulzer
5	Power supply	Sulzer/S-chem
6	Suitable crane for lifting and lowering materials. As well as material lifting basket	Sulzer
7	Site amenities water/office/mess and change/locker Room.	S-chem
8	Lockable storage for the small items and equipment	S-chem
9	Internal scaffolds for working platforms	S-chem
10	External scaffolds for working platforms (If required)	S-chem
11	Internal lighting as required Class 1Div1	S-chem
12	External lighting (If required)	S-chem

6.0 MATERIAL STORAGE AND TRANSPORTATION

Client to supply a suitable lay down area for sorting and checking materials prior to the Shutdown.
New internals material shall be delivering on pallets or in wooden crates to the designated preparation area prior to installation. The packing pallets / crates will only be open in the presence of a specialist from

internals vendor, if found any transport damage Sulzer TFS will be report immediately to the concern S-chem person.
During the pre-installation period, all crates to be checked against packing lists and internals drawings, all tray internals will be arranged in sequence of installation, Mock-up assembly will be carried out for new internals.

7.0 MATERIAL LIFTING/HANDLING TO/FROM THE COLUMN

Transportation of internals from lay-down area to near COLUMN will be the responsibility of SULZER TFS-S-chem
All the work is to be carried out with the emphasis on safety, over and above all other considerations, and is subject to the statutory and mandatory health and safety regulations appertaining thereto, together with the Sulzer Chemtech (UK) Limited SCC and S-Chem Project procedure, manual and HSE plan.

All COLUMN internals (existing and new) which are heavier than 45 kg Sulzer will be loaded and transferred to the required location / elevation-utilizing Sulzer certified material baskets with help of Crane, Lifting will be carried out in Day and Night shift.

During removal of column internals trays two or three material baskets will be used to expedite the work, once loaded material basket will be sent to ground for unloading the next empty basket immediately will be sent to the required location on the Tower for further removal activities. Similarly, during installation time the baskets will be loaded in such a way that installation will be almost continuous furthermore, baskets will be pre-loaded at ground level in readiness to supply each of required locations.

To start the work Sulzer shall follow S-Chem Permit to work procedure along with the approved method statement, Risk Assessment and plot plan /drawings showing the working proposal shall be submitted to Contractor.
Sulzer shall commence the work only after displaying work permit approved by Contractor on the site. All lifting appliances and lifting tackle shall have S-Chem approved third party certification before mobilizing to site.
All persons must wear mandatory PPEs as per project HSE plan and as per S-Chem site requirement, All tools and equipment's must be inspected or physically checked before use, Proper barricades always be provided and maintained around working area, Warning signboard must be display at the work location, Access must be kept clear and uninterrupted, TBT & STARRT shall be conducted before starting the works, Job risk prediction shall be done daily by supervisor & workers and potential hazards shall be highlighted during TBT, All moving equipment shall be checked by check list, House Keeping shall be carried out in proper way each day/night shifts and the waste shall be disposed in the designated place approved by Company, Dust prevention shall be made in case required.

In emergency case ambulance is available. For any emergency evacuation, buses will be brought to bus boarding point / muster point in each terrace from bus parking.
It shall be the responsibility of SULZER TFS Project Management team to ensure that the overall requirement explained in the WMS are understood and followed. HSE Manager / team shall ensure that the requirements explained in this WMS are implemented during Day / Night shift works.
Works shall only be performed after obtaining approved work permit issued by S-Chem for preparation of the ground prior to erection, the ground is strong enough to bear the load of the Crane and the total load to be lifted.

All Equipment shall be inspected by Equipment inspector of S-Chem with third party certificate and manufacture specification
Daily TBT & STARRT shall be conducted to rigger and crane operator by Sulzer Supervisor prior to the start of the work.

Selection of the crane for erection purpose shall be by calculating the total weight to be lifted & the radius of operation. The outriggers of the crane should be proper extended, and the pads should not be cracked or damaged. Only third party approved and certified crane operators with valid licenses shall be used for the operation. The counterweight swing radius of the crane shall be adequately barricaded & checked for fouling before actual operation. Only third party approved certified riggers / signalman shall be provided for rigging activity and should wear reflective vest when they are engaged in rigging. The lifting / erection area shall be barricaded. All tools equipment's, shackles & slings shall be inspected and color coded. Wind speed shall be checked at site prior to commencing lift. If wind speed exceeds Crane manufacturer's recommendations or 32km/h wind velocity the lift shall be stopped. Nobody shall be allowed to stand or walk under the suspended load. Two taglines which are of adequate length shall be used to control load. Periodically inspected and approved fire extinguisher shall be available at the work location. Whether the crane position and the level of illumination is adequate for erection should be confirmed by supervisor. Prior to erection, area barricading, sign boards placing, safety personnel presence checking and stopping all on-going activities within the operating radius + 10% safety margin.

Adequate lighting shall be provided around the working area and lifting / erection area near the base of the Tower and the material lay down area at the site. External lighting shall be provided by S-Chem for external activity. If the existing Tower Lighting is not enough, then Sulzer will also need to provide halogen lighting at the existing external platforms and the external scaffold. If required.

All persons must wear reflective coverall / vest and signal man shall be provided with a Baton Lighting for signaling during nighttime activities.
The Sulzer Certified Lifting baskets will be initially hook up with Platform railing near COLUMN manhole to avoid swing of basket.

8.0 WASTE DISPOSAL

Any consumables or waste will be deposited in Client supplied waste skips/bins

All old column internals material shall be disposed in client provided material skips, or it is S-Chem responsibility to dispose removed column internals materials

9.0 COLUMN VENTILATION

The intent of this Ventilation Plan is to ensure a safe, efficient ventilation to be provided in Column to carry out the removal, installation & inspection of Tower Internals

All the work is to be carried out with the emphasis on safety, over and above all other considerations, and is subject to the statutory and mandatory health and safety regulations appertaining thereto, together with the Sulzer Chemtech (UK) Limited SCC and S-Chem Project procedure, manual and HSE plan.

The Client Area Manager and HSE Manager shall ensure that all the requirements are implemented prior to the start of internal activities; it shall be the responsibility of the Sulzer Project Management Team to provide the resources required for implementation of this plan. The HSE Manager / team shall ensure that the requirements explained in this plan are implemented during works.

The Project Manager is to identify the capacity of the resources required based on work scope Supervisors are to ensure parameters identified in plan are achieved also they are to ensure that a risk assessment is carried out and that the ventilation plan is approved. Adequate communication between the internal work force and the entry attendant based outside shall be ensured.

The Entry Attendant (standby man) must constantly monitor the confined space atmosphere, in situation gas monitor alarms for unsafe confined space atmosphere, shall follow the Emergency Procedure and facilitate evacuation of all entrants and verify that gas monitors are calibrated.
Confined Space Entrants shall understand the hazards involved with working in Confined Spaces and in case any entrant feels uneasy shall depart from the confined space and immediately inform his Supervisor.

The workforce shall all be trained with training records maintained.
The HSE Supervisor is to verify the permit to work requirements are met and verify that the gas monitoring is performed by Hole Watch at regular intervals.
All Sulzer personnel shall always carry Multi Gas Monitors.
Air Jet Blower/Electrical Fan will be installed at one or two locations or Air horn type air extractor will be located near each manhole to ventilate the column.
Depending on the man entry at respective manhole the air horn can be removed and relocated.

The Rescue Team shall be made aware that the internal work is in progress and should therefore be available to deal with any emergency that could arise.
The related risk assessments should address the following

- Oxygen Deficiency
- Oxygen Efficiency
- Personal injury
- Exposure to harmful substances
- Asphyxiation
- Inhalation of Fumes
- Fire enhanced atmosphere
- Fire and Explosion
- Inhalation of hazardous gases/ Explosion
- Slip trip hazard

10.0 INTERNAL LIGHTING

Sulzer shall provide the entire internal 24 Volt lighting for all work areas. The lighting will be pre- rigged on the relevant platforms during the preparation period
The external cables will be tied off at enough locations to the external scaffold/column platform using cable ties and cable hooks. Individual lighting sets will be located at each platform level adjacent to existing Man Doors

When the lighting sets are introduced into the Tower at each of the working levels the cables which extend through the man Doors will be tied off at the top of the Man Doors utilizing the Man Door bolt holes to tie off the cables using the cable ties, this is in order to avoid tripping hazards and to avoid any damage to the cables during removal and installation of the Tower Internals and attachments.
Inside the Tower the lighting sets can be initially attached / supported from the Tray attachments or support beam via manholes

11.0 MAIN TOWER EQUIPMENT

Please see sketch on the following page which shows the main equipment to be used for the COLUMN

Electrical cables / welding cables and air hoses for internal work will be fed from the generators / compressors up to the inside of the external platforms.

The external cables / hoses will be tied off at enough locations to the external platform using cable ties, cable hooks ropes and hose arrestors.

Individual cables and hoses will be located at each platform level adjacent to existing Man Doors. Inside Column initially the cables and hoses will be supported from existing tray beams and as work progresses, they will be supported from newly installed internals and exiting Column attachment

SITE TOOLS AND EQUIPMENTS

A) FALL PROTECTION DEVICE

Certified fall protection device shall be use while ascending & descending inside column by using ladder

B) FULL BODY HARNESS WITH DOUBLE LANYARD

Safety harness will be used for work at height as well as in confined space

Body harness without lanyard will be used in confined space for rescue purpose only

If any temporary platform inside column like scaffolding 100% tie off required

C) LIFTING CANVAS BUCKET

Lifting Canvas Bucket-USA made in closed Zip type

Purpose to use: Transferring material from ground to column platforms, Due to zip, material (Hand tools) secured inside Bag, there is no chance to fell

D) TOOLBOX

Purpose to use: Store small size of spanners, hammers, screw drivers, bolts, gaskets etc.

E) FINGER SAVER USA MADE & BRASS HAMMER

Finger saver USA Made & Brass hammer

Purpose to use: To protect finger's against & line of fire while using hammer

12.0 SCAFFOLDING

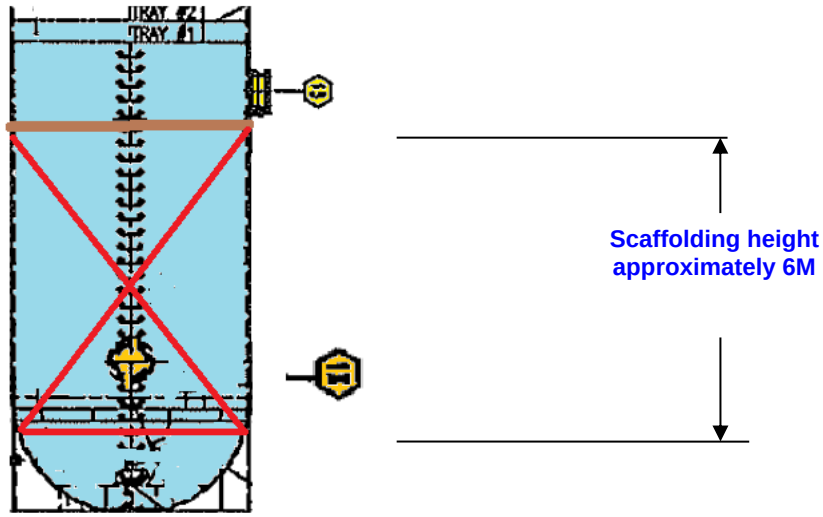
All internal scaffolding to be supplied/ Erected & removed by S-chem
All external scaffolding to be supplied/ Erected & removed by S-chem

12.1 EXTERNAL SCAFFOLDING

It is assumed that existing access platform outside of Manways will be a sufficient size enough size to remove/install COLUMN internals.

12.2 INTERNAL SCAFFOLDING

Internal scaffold to be installed to assist in bottom dish cleaning



13.0 SITE WORK PROCEDURE

Entry into the column will only be carried out once the permit has been issued and a full Understanding of the requirements is explained to all involved persons.
At all times a manhole watcher is to be positioned at the points of entry when personnel are in the Column access and egress into the column will be via ladder as required, inertia reel and Safety Harness must be worn when ascending and descending ladders within the column and will be strictly controlled by the manhole watcher.

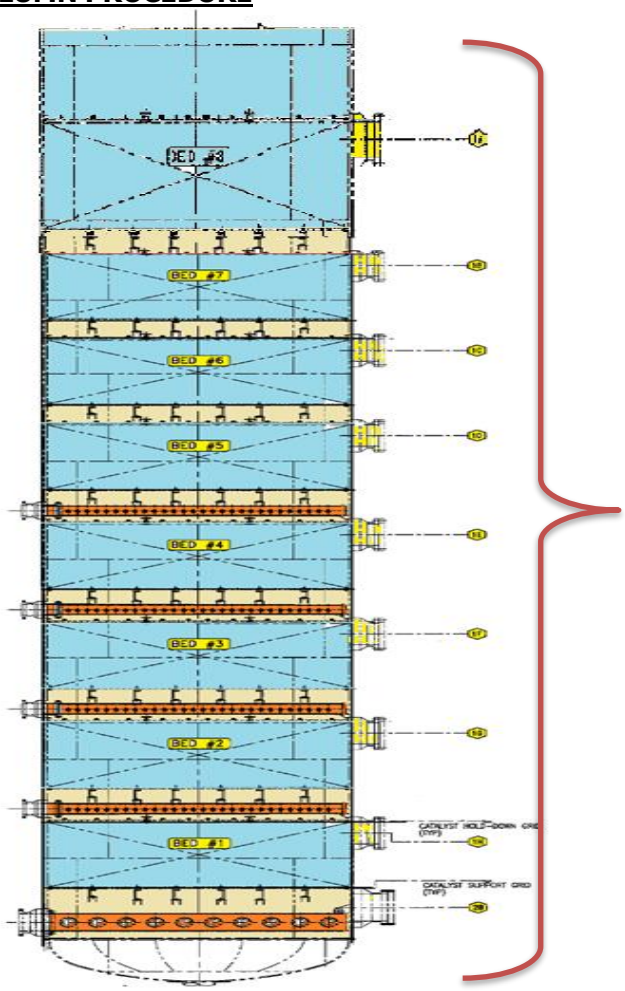
NOTE

The Inertia reel to be shackled/tied off to the external manhole bolt holes or a Secure fixed point inside/outside the column (to be agreed on site).

14.0 PRE-ENTRY INTO THE COLUMN

14.1	Pre-rig equipment in readiness for column entry	Sulzer
14.2	Provide external lighting.	S-chem
14.3	Position internal lighting outside respective column manholes.	Sulzer
14.4	Spade isolate and gas free.	Sulzer/S-chem
14.5	Open column Manholes	Sulzer
14.6	Issue Entry/work permits	S-chem
14.7	Build up the scaffolding internally or externally as per Requirement	S-chem

15.0 COLUMN PROCEDURE



CATALYST BED #1 TO #8

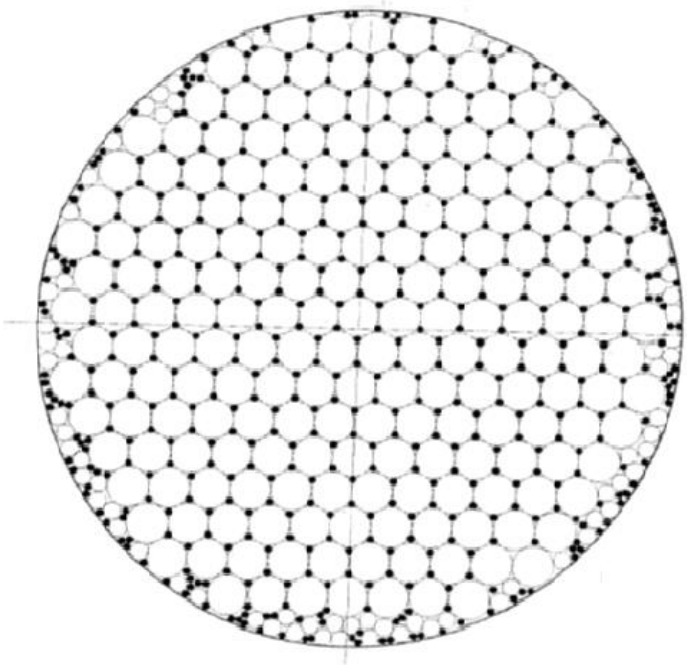
- Erect scaffold at bottom dish.
- Removal of feed pipe for access purpose.
- Top bed cleaning and inspection.
- Bed #1 to #8 catalyst replacement.
- MD tray #1, 8, 9, 10.
- Bottom dish hydro jet cleaning and inspection.
- Removal of scaffold from bottom dish.

15.1	**ENTRY THROUGH MANWAY-2A-TOP BED**	
15.1.1	Spade Isolate the column. Spade Isolate the nozzles as per Blind List. **Note: Item to be re-used.**	Sulzer /S-chem
15.1.2	Open Manholes M1, to M13 to make internal ventilation& light arrangement. Before entering the column make sure that gas free column & all Permits made ready.	Sulzer /S-chem
15.1.3	Initial joint inspection of column internals through M1 to M13.	Sulzer /S-chem
15.1.4	Remove inlet feed pipe for access purpose.	Sulzer
15.1.5	Remove pre distributor, VER2 distributor and RPB for access purpose.	Sulzer
15.1.6	Clean & inspect top section internals.	Sulzer
15.1.7	Hydro jet cleaning of removed internals outside of column.	Sulzer
15.1.8	Inspection & level check of random packing.	Sulzer /S-chem
15.1.9	Top up random packing if required as per inspection recommendation.	Sulzer
15.1.10	Inspection by client.	Sulzer /S-chem
15.1.11	Install bed limiter, VER2 distributor & pre-distributor.	Sulzer
15.1.12	Inspection by S-chem.	Sulzer /S-chem
15.2	**ENTRY THROUGH MANHOLE-1A-BED-8**	
15.2.1	After entry through manhole 1A Sulzer TFS will start manually removal of catalyst bales	Sulzer
15.2.2	Catalyst bales shall be removed one by one in pieces and then will pass outside via manhole 1A And then will collect Catalyst in Sulzer certified material basket and then will lower down to ground level by crane.	Sulzer
15.2.2	Old catalyst shall be contained in jumbo bag in s-chem temporary storage area near reactor for disposal	Sulzer

15.2.3	After removal of all 6-layers catalyst bales Sulzer will proceed to clean shell area and support grid and then will request to client for inspection.	Sulzer
15.2.4	Based on inspection and acceptance Team-A will move on bed-7	Sulzer
15.4	**ENTRY THROUGH MANHOLE-1B -BED-7**	
15.3.1	After entry through manhole 1B Sulzer TFS will start manually removal of catalyst bales	Sulzer
15.3.2	Catalyst bales shall be removed one by one in pieces and then will pass outside via manhole 1B And then will collect Catalyst in Sulzer certified material basket and then will lower down to ground level by crane.	Sulzer
15.3.3	Old catalyst shall be contained in jumbo bag in s-chem temporary storage area near reactor for disposal	Sulzer
15.3.4	After removal of all 6-layers catalyst bales Sulzer will proceed to clean shell area and support grid and then will request to client for inspection.	Sulzer
15.3.5	Based on inspection and acceptance Team-A will move on bed-6	Sulzer
15.4	**ENTRY THROUGH MANHOLE-1C -BED-6**	
15.4.1	After entry through manhole 1C Sulzer TFS will start manually removal of catalyst bales	Sulzer
15.4.2	Catalyst bales shall be removed one by one in pieces and then will pass outside via manhole 1C And then will collect Catalyst in Sulzer certified material basket and then will lower down to ground level by crane.	Sulzer
15.4.3	Old catalyst shall be contained in jumbo bag in s-chem temporary storage area near reactor for disposal	Sulzer
15.4.4	After removal of all 6-layers catalyst bales Sulzer will proceed to clean shell area and support grid and then will request to client for inspection.	Sulzer
15.4.5	Based on inspection and acceptance Team-A will move on bed-5	Sulzer
15.5	**ENTRY THROUGH MANHOLE-1D -BED-5**	
15.5.1	After entry through manhole 1D Sulzer TFS will start manually remove catalyst bales removal by manually	Sulzer
15.4.2	Catalyst bales shall be removed one by one in pieces and will transfer outside via manhole 1D and contain in Sulzer certified material basket and then will transfer to ground level by crane.	Sulzer

15.4.3	Old catalyst shall be contained in jumbo bag in s-chem temporary storage area near reactor	Sulzer
15.4.4	After removal of 6 layers catalyst bales Sulzer will proceed to clean shell area and support grid and then will request to client for inspection,	Sulzer
15.4.5	Based on inspection and acceptance Team-A will move on bed-4	Sulzer
15.6	**ENTRY THROUGH MANHOLE-1E -BED-4**	
15.6.1	After entry through manhole 1E Sulzer TFS will start manually remove catalyst bales removal by manually	Sulzer
15.6.2	Catalyst bales shall be removed one by one in pieces and will transfer outside via manhole 1E and contain in Sulzer certified material basket and then will transfer to ground level by crane.	Sulzer
15.6.3	Old catalyst shall be contained in jumbo bag in s-chem temporary storage area near reactor	Sulzer
15.6.4	After removal of 6 layers catalyst bales Sulzer will proceed to clean shell area and support grid and then will request to client for inspection,	Sulzer
15.6.5	After this bed support shall be partially open to access distributor inspection	Sulzer
15.6.6	Following inspection recommendation Sulzer will proceed manually or hydro clean of distributor	Sulzer
15.6.7	After cleaning and inspection acceptance Team-A will move on bed-3	Sulzer
15.7	**ENTRY THROUGH MANHOLE-1F -BED-3**	
15.7.1	After entry through manhole 1F Sulzer TFS will start manually remove catalyst bales removal by manually	Sulzer
15.7.2	Catalyst bales shall be removed one by one in pieces and will transfer outside via manhole 1F and contain in Sulzer certified material basket and then will transfer to ground level by crane.	Sulzer
15.7.3	Old catalyst shall be contained in jumbo bag in s-chem temporary storage area near reactor	Sulzer
15.7.4	After removal of 6 layers catalyst bales Sulzer will proceed to clean shell area and support grid and then will request to client for inspection,	Sulzer

15.7.5	After this bed support shall be partially open to access distributor inspection	Sulzer
15.7.6	Following inspection recommendation Sulzer will proceed manually or hydro clean of distributor	Sulzer
15.7.7	After cleaning and inspection acceptance Team-A will move on bed-2	Sulzer
15.8	**ENTRY THROUGH MANHOLE-1G -BED-2**	
15.8.1	After entry through manhole 1G Sulzer TFS will start manually remove catalyst bales removal by manually	Sulzer
15.8.2	Catalyst bales shall be removed one by one in pieces and will transfer outside via manhole 1G and contain in Sulzer certified material basket and then will transfer to ground level by crane.	Sulzer
15.8.3	Old catalyst shall be contained in jumbo bag in s-chem temporary storage area near reactor	Sulzer
15.8.4	After this bed support shall be partially open to access distributor inspection	Sulzer
15.8.5	Following inspection recommendation Sulzer will proceed manually or hydro clean of distributor	Sulzer
15.8.6	After cleaning and inspection acceptance Team-A will move on bed-1	Sulzer
15.9	**ENTRY THROUGH MANHOLE-1H -BED-1**	
15.9.1	After entry through manhole 1H Sulzer TFS will start manually remove catalyst bales removal by manually Distributor shall be removed for cleaning (if required)	Sulzer
15.9.2	Catalyst bales shall be removed one by one in pieces and will transfer outside via manhole 1H and contain in Sulzer certified material basket and then will transfer to ground level by crane.	Sulzer
15.9.3	Old catalyst shall be contained in jumbo bag in s-chem temporary storage area near reactor	Sulzer
15.9.4	After removal of 6 layers catalyst bales Sulzer will proceed to clean shell area and support grid and then will request to client for inspection.	Sulzer
15.10	**ENTRY THROUGH MANHOLE-1H -BED-1**	

15.10.1	After hot work completion Sulzer TFS will start loading new catalyst loading with presence of catalyst vendor	Sulzer
15.10.2	New catalyst bales will be loaded in Sulzer material basket in good manners and then will lift basket up to the manhole level with help of crane	Sulzer
15.10.3	Then Catalyst bales will pass through manhole-1H by manually and then will be installed as per loading plan Refer below snap: - 	Sulzer
15.10.4	Interim inspection will be performed by both party and inspection record shall be maintain	Sulzer
15.10.5	**CATALYST LOADING RECORD FORM**	

BED	LAYER	NUMBER OF LARGE BALES	NUMBER OF SMALL BALES	NUMBER OF MINI BALES	TOTAL LARGE BALES	TOTAL SMALL BALES	TOTAL MINI BALES
1	1						
	2						
	3						
	4						
	5						
	6						
	1						
	2						

	2	3							
		4							
		5							
		6							
	3	1							
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	7	1							
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		3							
		4							
		5							
		6							
	8	1							
		2							
		3							
		4							
		5							
		6							

						Grand Totals			
						Shipped			

15.10.6	After completion of bed1 06 layer of new catalyst loading distributor shall be install (If removed) And then will request to client for inspection	Sulzer
15.10.7	Based on inspection acceptance Sulzer TFS Team A will move on BED-2	Sulzer
15.11	**ENTRY THROUGH MANHOLE-1G -BED-2**	
15.11.1	After entry through manhole 1G Sulzer TFS will start loading new catalyst loading with presence of vendor	Sulzer
15.11.2	New catalyst bales will be loaded in Sulzer material basket in good manners and then will lift basket up to the manhole level with help of crane	Sulzer
15.11.3	Then Catalyst bales will pass through manhole-1G by manually and then will be installed as per loading plan Same installation procedure will follow	Sulzer
15.11.4	Based on inspection acceptance Sulzer TFS Team A will move on BED-3	Sulzer
15.12	**ENTRY THROUGH MANHOLE-1F -BED-3**	
15.12.1	After entry through manhole 1F Sulzer TFS will start loading new catalyst loading with presence of vendor	Sulzer
15.12.2	New catalyst bales will be loaded in Sulzer material basket in good manners and then will lift basket up to the manhole level with help of crane	Sulzer
15.12.3	Then Catalyst bales will pass through manhole-1F by manually and then will be installed as per loading plan Same installation procedure will follow	Sulzer
15.12.4	Based on inspection acceptance Sulzer TFS Team A will move on BED-4	Sulzer
15.13	**ENTRY THROUGH MANHOLE-1E -BED-4**	
15.13.1	After entry through manhole 1F Sulzer TFS will start loading new catalyst loading with presence of vendor	Sulzer
15.13.2	New catalyst bales will be loaded in Sulzer material basket in good manners and then will lift basket up to the manhole level with help of crane	Sulzer

15.13.3	Then Catalyst bales will pass through manhole-1E by manually and then will be installed as per loading plan Same installation procedure will follow	Sulzer
15.13.4	Based on inspection acceptance Sulzer TFS Team A will move on BED-5	Sulzer
15.14	**ENTRY THROUGH MANHOLE-1D -BED-5**	
15.14.1	After entry through manhole 1D Sulzer TFS will start loading new catalyst loading with presence of vendor	Sulzer
15.14.2	New catalyst bales will be loaded in Sulzer material basket in good manners and then will lift basket up to the manhole level with help of crane	Sulzer
15.14.3	Then Catalyst bales will pass through manhole-1D by manually and then will be installed as per loading plan Same installation procedure will follow	Sulzer
15.14.4	Based on inspection acceptance Sulzer TFS Team A will move on BED-6	Sulzer
15.15	**ENTRY THROUGH MANHOLE-1C -BED-6**	
15.15.1	After entry through manhole 1C Sulzer TFS will start loading new catalyst loading with presence of vendor	Sulzer
15.15.2	New catalyst bales will be loaded in Sulzer material basket in good manners and then will lift basket up to the manhole level with help of crane	Sulzer
15.15.3	Then Catalyst bales will pass through manhole-1C by manually and then will be installed as per loading plan Same installation procedure will follow	Sulzer
15.15.4	Based on inspection acceptance Sulzer TFS Team A will move on BED-7	Sulzer
15.16	**ENTRY THROUGH MANHOLE-1B -BED-7**	
15.16.1	After entry through manhole 1B Sulzer TFS will start loading new catalyst loading with presence of vendor	Sulzer
15.16.2	New catalyst bales will be loaded in Sulzer material basket in good manners and then will lift basket up to the manhole level with help of crane	Sulzer

15.16.3	Then Catalyst bales will pass through manhole-1B by manually and then will be installed as per loading plan Same installation procedure will follow	Sulzer
15.16.4	Based on inspection acceptance Sulzer TFS Team A will move on BED-8	Sulzer
15.17	**ENTRY THROUGH MANHOLE-1A -BED-8**	
15.17.1	After entry through manhole 1A Sulzer TFS will start loading new catalyst loading with presence of vendor	Sulzer
15.17.2	New catalyst bales will be loaded in Sulzer material basket in good manners and then will lift basket up to the manhole level with help of crane	Sulzer
15.17.3	Then Catalyst bales will pass through manhole-1A by manually and then will be installed as per loading plan Same installation procedure will follow	Sulzer
15.17.4	Based on inspection acceptance Sulzer TFS Team A will move on tray section.	Sulzer
15.18	**ENTRY THROUGH MANHOLE #1I, #1J & #15**	
15.18.1	Erect scaffold at bottom dish.	
15.18.2	Manual clean & inspect UOP MD trays #1, 8, 9 & 10.	
15.18.3	Hydro jet clean of bottom sump.	
15.18.4	Buffing support for inspection.	
15.18.5	NDT inspection and post cleaning by Client.	S-chem
15.18.6	Open Skirt manways	Sulzer
15.18.7	Set up ventilation & 24V lights	Sulzer
15.18.8	Scaffolding, Insulation & NDT work	S-chem
15.18.9	Close Skirt Manways	Sulzer

15.18.10	Final inspection	S-chem
15.18.11	Removal internal scaffolding	S-chem
15.18.12	Connect back all instruments, PT, LT, and level glass apparatus taps.	Sulzer
15.18.13	Remove Lights & ventilation	S-chem
15.18.14	Execute vessel closure inspection and complete form	Sulzer
15.18.15	Column Manhole Box up	Sulzer
15.18.16	De blinding of column	Sulzer

16.0 HAND-OVER OF THE COLUMN

16.1	De-rig all Sulzer main equipment from the column.	Sulzer
16.2	Issue QA Pack to client.	Sulzer

17.0 Appendix -A

Identifier	CTP02008
Title	**Supervision Report (Trays)**
Document	FO-SQA-5.45CT_IMS_DOCUMENT.dot
Valid for	TFS_GLOBAL_en
Owner / Approver	Jonathan Marley / Neal Granycome
Revision	A

SULZER

Sulzer Chemtech

COLUMN TRAYS & INTERNALS ERECTION/SUPERVISION REPORT

CLIENT: _____ **ORDER /JOB No:** _____

LOCATION: _____ **TFS JOB No:** _____

COLUMN No: _____

INTERNALS COMPRISING:- _____

EXECUTED WORK INSPECTIONS	YES	NO	N.A	REMARKS
1. All bolting & fixings correct to drawing.				
2. Correct Valves / Bubble caps fitted.				
3. Sieve Tray hole sizes & spacing correct to drawing.				
4. Tray decks & Downcomers fully gasketed.				
5. Seal Pan below tray(s) ….. Gasketed/seal welded as per drawing requirements.				
6. All trays level to within tolerance, i.e. Max 0.3% of dia or 6mm whichever is the lesser.				
7. All Trays underflow downcomer clearances correct to drawing. Tolerance +/- 3mm.				
8. Inlet Weir heights correct to drawing.				
9. Outlet Weir heights correct to drawing.				
10. Tray deck inlet areas seal welded.				
11. Chimney / Draw off Tray(s) …… fully gasketed / seal welded to drawing.				
12. Leak test Chimney / Draw off Tray(s) … Acceptable. *(Should the Client wish to waiver Leak test, or any other deviation, a statement **must** be written in remarks box).*				
13. Feed pipes – Nozzle(s) ….. above Tray(s) ….. fitted.				
14. Schoepentoeter Gas inlet device fitted at Nozzle(s) ……				
15. Demister elevation(s) …….. fitted.				
16. Cleanliness of new internals after installation.				
17. Drain valves, open orifices etc. inspected for loose hardware / debris.				
18. Written reports as applicable to contract requirements.				
19. Modifications				
20. Manholes Closed				

SULZER TFS	CLIENT
NAME: _____	NAME: _____
SIGNATURE: _____	SIGNATURE: _____
DATE: _____	DATE: _____

Supervision Report (Trays)
Rev A / CTP02008 / FO-SQA-5.45

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18.0 Appendix B

Identifier	CTP02017
Title	**Tray Manway Closure Checklist**
Document	FO-SQA-5.45.BCT_IMS_DOCUMENT.dot
Valid for	TFS_GLOBAL_en
Owner / Approver	Jonathan Marley / Neal Granycome
Revision	A

SULZER

Sulzer Chemtech

CLIENT: _____ **CONTRACT No:** _____

PROJECT: _____

COLUMN / ITEM No: _____

Tray Manway No's: _____ **TO:** _____

OPERATION	YES	NO	N.A
Check – Is hardware correct to drawing			
Check – Bolting is tight and fastened as required			
Check – No loose hardware is left			
Check – Area is clean and free from debris			

OPERATOR	SIGNATURE	DATE COMPLETE

COMMENTS:

SUPERVISOR SIGNATURE: _____ **DATE:** _____

Tray Manway Closure Checklist
Rev A / CTP02017 / FO-SQA-5.45.B

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19.0 Appendix E

Identifier	CTP02019
Title	**Mechanical Completion Report**
Document	FO-SQA-5.54CT_IMS_DOCUMENT.dot
Valid for	TFS_GLOBAL_en
Owner / Approver	Jonathan Marley / Neal Granycome
Revison	A

SULZER

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Mechanical Completion Certificate (MCC)	Project:	

MCC Unit:		**Engineer:**	
MCC Vessel:			
MCC Supporting Doc's:	Supervisors Report	**Supervisor:**	
Project Work Scope			
Description:			
Applicable Drawing No's:			
It is hereby certified that the vessel and internal equipment has been installed and inspected in accordance with work instruction IN-SQA-4.24.			
Comments:			

SULZER TFS		CLIENT	
NAME:		NAME:	
SIGNATURE		SIGNATURE:	
DATE:		DATE:	

Mechanical Completion Report
Rev A / CTP02019 / FO-SQA-5.54

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